CLAIMS

What is claimed is:

1. A torque biasing system, comprising:

a clutch pack;

a motor that manipulates engagement of said clutch pack based on a control signal; and

a control module that generates said control signal based on a torque command and a calculated torque, wherein said calculated torque is determined based on a model of said torque biasing system.

2. The torque biasing system of claim 1 further comprising a clutch operator mechanism that is driven by said motor and that imparts a linear force on said clutch pack.

3. The torque biasing system of claim 1 wherein said control signal is based on a difference between said torque command and said calculated torque.

4. The torque biasing system of claim 1 wherein said motor includes a position sensor that generates an armature position signal, a temperature sensor that generates a temperature signal and a current sensor that generates a current signal, wherein said calculated torque is determined based on said armature position signal, said temperature signal and said current signal.

5. The torque biasing system of claim 1 wherein said clutch pack includes a temperature sensor that generates a temperature signal, wherein said calculated torque is determined based on said temperature signal.

6. The torque biasing system of claim 1 wherein said model of said torque biasing system includes a motor module, a clutch operator module and a clutch pack module.

7. The torque biasing system of claim 6 wherein said motor module generates a first position signal based on said control signal, a motor armature position, a motor temperature, a motor current, motor data and a resistance torque generated by said clutch operator module.

8. The torque biasing system of claim 6 wherein said clutch operator module generates a second position signal and a resistance torque based on a first position signal generated by said motor module, clutch operator data and a resistance force generated by said clutch module.

9. The torque biasing system of claim 6 wherein said clutch module determines said calculated torque and a resistance force based on a second position signal generated by said clutch operator module, clutch data, a clutch temperature and clutch kiss point data.

10. A method of controlling a torque biasing system, comprising:

generating a torque command;

determining a calculated torque based on a model of said torque biasing system;

determining a control signal based on said torque command and said calculated torque; and

controlling said torque biasing system based on said control signal.

11. The method of claim 10 wherein said control signal is based on a difference between said torque command and said calculated torque.

12. The method of claim 10 wherein said calculated torque is determined based on an armature position, a motor temperature and a motor current.

13. The method of claim 10 wherein said calculated torque is determined based on a clutch temperature.

14. The method of claim 10 further comprising generating a first position signal in a motor module based on said control signal, a motor armature position, a motor temperature, a motor current, motor data and a resistance torque generated by a shift system module.

15. The method of claim 10 further comprising generating a second position signal and a resistance torque in a clutch operator module based on a first position signal generated by a motor module, clutch operator data and a resistance force generated by a clutch module.

16. The method of claim 10 wherein further comprising determining said calculated torque and a resistance force in a clutch model based on a second position signal generated by a clutch operator module, clutch data, a clutch temperature and kisspoint data.

17. A method of controlling a torque biasing system, comprising:

determining a torque command;

calculating a torque error based on said torque command and a model-based torque;

generating a control signal based on said torque error; and

operating said torque biasing system based on said control signal.

18. The method of claim 17 further comprising processing a previous control signal through a torque biasing system model to generate said model-based torque.

19. The method of claim 18 wherein said torque biasing system model includes a motor model, a clutch operator model and a clutch model.

20. The method of claim 19 further comprising processing said control signal through said motor model to generate a clutch operator interconnection value.

21. The method of claim 20 wherein said clutch operator interconnection value is generated based on a resistance torque, a motor position signal and motor data.

22. The method of claim 21 further comprising calculating said resistance torque using said clutch operator model.

23. The method of claim 19 further comprising processing an interconnection position value through said clutch operator model to generate a clutch interconnection value.

24. The method of claim 23 wherein said clutch interconnection value is generated based on a resistance force and clutch operator data.

25. The method of claim 24 further comprising calculating said resistance force using said clutch model.

26. The method of claim 19 further comprising processing a clutch interconnection value through said clutch model to generate said model-based torque.

27. A vehicle, comprising:

a first driveline that drives a first wheel;

a second driveline that drives a second wheel;

a torque biasing system that distributes drive torque between said first and second drivelines, comprising:

a clutch pack;

a motor that manipulates engagement of said clutch pack based on a control signal; and

a control module that generates said control signal based on a torque command and a calculated torque, wherein said calculated torque is determined based on a model of said torque biasing system.

28. The vehicle of claim 27 wherein the torque biasing system further comprises a clutch operator mechanism that is driven by said motor and that imparts a linear force on said clutch pack.

29. The vehicle of claim 27 wherein said control signal is based on a difference between said torque command and said calculated torque.

30. The vehicle of claim 27 wherein said motor includes a position sensor that generates an armature position signal, a temperature sensor that generates a temperature signal and a current sensor that generates a current signal, wherein said calculated torque is determined based on said armature position signal, said temperature signal and said current signal.

31. The vehicle of claim 27 wherein said clutch pack includes a temperature sensor that generates a temperature signal, wherein said calculated torque is determined based on said temperature signal.

32. The vehicle of claim 27 wherein said model of said torque biasing system includes a motor module, a clutch operator module and a clutch pack module.

33. The vehicle of claim 32 wherein said motor module generates a first position signal based on said control signal, a motor armature position, a motor temperature, a motor current, motor data and a resistance torque generated by said clutch operator module.

34. The vehicle of claim 32 wherein said clutch operator module generates a second position signal and a resistance torque based on a first position signal generated by said motor module, clutch operator data and a resistance force generated by said clutch module.

35. The vehicle of claim 32 wherein said clutch module determines said calculated torque and a resistance force based on a second position signal generated by said clutch operator module, clutch data, a clutch temperature and clutch kiss point data.

36. The vehicle of claim 27 further comprising first and second wheel speed sensors that respectively monitor first and second wheel speeds of said first and second wheels, wherein said calculated torque is determined based on said first and second wheel speeds.